Patent
Attorney's Docket No. 040071-080

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	)	**Mail Stop Appeal Brief - Patents**
Per-Olof BRANDT	)	Group Art Unit: 2666
Application No.: 09/617,678	)	Examiner: Frank Duong
Filed: July 14, 2000	)	
For: FREQUENCY MULTIPLEXER	)	

APPEAL BRIEF PURSUANT TO 37 C.F.R §41.37

Commissioner for Patents
Alexandria, VA 22313-1450

Sir:

Further to the Notice of Appeal filed on October 20, 2004 in connection with the above-identified application, submitted herewith is the requisite Appeal Brief and corresponding fee.

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(i) REAL PARTY IN INTEREST

The real party in interest is the assignee, Telefonaktiebolaget LM Ericsson (Publ).

(ii) RELATED APPEALS AND INTERFERENCES

To the best of the undersigned's knowledge, there are no related appeals or interferences.

(iii) STATUS OF CLAIMS

Claims 1-17 are currently pending, have all been finally rejected and are all the subject of this appeal.

(iv) STATUS OF AMENDMENTS

No Amendments have been submitted in this application subsequent to the Final Office Action.

(v) SUMMARY OF CLAIMED SUBJECT MATTER

The present invention provides frequency multiplexers that permit selection of circuit paths associated with different frequency signals, in particular, in applications where the frequency bands are relatively close to one another. *See* page 3, lines 6-15 of the specification. Referring now to Figure 2 of the present application, such frequency multiplexers can be used to select a circuit path between one input (e.g., 1st high band 10) and a common output, while blocking the other circuit paths which lead to the common output.

Filters are used in each circuit path to perform the selective signal blocking or passing that results in the composite device acting as a multiplexer.

Referring now to independent claim 1 and Figure 2 of the present application, an exemplary frequency multiplexer according to the present invention comprises a plurality of circuits connected to a common terminal 50 wherein each of the circuits comprises a filter (15 or 25) and a device (12 or 22) connected to the filter. Each device has first and second states associated with the position of the switch (SW1 or SW2). For example, when it is desired to select the circuit path between terminal 20 and terminal 50 in the frequency multiplexer of Figure 2, SW1 is turned on by controller 1A and SW2 is turned off by controller 2A. *See* page 8, lines 15-27 of the specification. This has the effect of switching in capacitor C1 and switching out capacitor C2 to vary the characteristics of filters 15 and 25. More specifically, turning on switch SW1 has the effect of implementing the second filter characteristic in filter 15, i.e., to substantially block first and second frequency bands (e.g., the high and low bands, respectively) such that the circuit path between terminal 10 and terminal 50 is blocked. Turning off switch SW1 has the effect of implementing the first filter characteristic in filter 25, i.e., to pass the first frequency band (e.g., the high band) and block the second frequency band (e.g., the low band). *Id.* Reversing the switch pattern, such that SW1 is off and SW2 is on, has the effect that the multiplexer selects the circuit path between terminal 10 and common output 50. *See* page 8, line 28- page 9, line 9.

Turning now to independent method claim 16 and the flowchart of Figure 4, a method for switching between frequency bands according to the present invention selects one (an active) circuit from among a plurality of circuits, e.g., at step 510. The device associated

with the selected (active) circuit is placed into the first state (e.g., switch = OFF) at step 512 and the devices associated with the other, non-selected circuits are placed into the second state (e.g., switch = ON) at step 514.

(vi) GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The only ground of rejection in this application is that claims 1-17 are allegedly anticipated under 35 U.S.C. §102(e) by U.S. Patent No. 6,308,051 to Atokawa ("Atokawa"). Appellant requests review of this ground of rejection on appeal.

(vii) ARGUMENT

In summary, Atokawa describes an antenna duplexer which fails to anticipate Appellant's claimed combination, fundamentally because it describes a duplexer rather than a multiplexer. As is well known in the art, a duplexer is a device which is designed to allow a single antenna to be used while simultaneously transmitting on one frequency and receiving on another frequency. As mentioned above, Appellant's described and claimed devices and methods are multiplexers which select one circuit path and block other circuit paths. Thus a fundamental difference arises because Atokawa describes a circuit having two circuit paths (transmit and receive) which can operate simultaneously, while Appellant's claimed combinations provide for the selection of a particular circuit path using, among other things, variable frequency filters.

Atokawa does provide for a variable bandwidth blocking filter circuit 27 on the transmit side and a variable bandwidth trap circuit 28 on the receive side of its duplexer.

However, these variable filters do not transform the fundamental duplexing nature of Atokawa into a multiplexing function. Instead, the variable filtering characteristics on the transmit and receive side of Atokawa are merely intended to isolate the transmitter and receiver from one another in a manner which varies depending upon which frequency bands are currently being used for transmission and reception.

More specifically, Atokawa discloses that when the bandwidth blocking filter circuit 27 on the transmission side is set for passing the 887-901 MHz frequency band, the bandwidth blocking filter circuit 27 blocks the frequency band 915-925 MHz and presents a high impedance for the 832-846 MHz frequency band. When the bandwidth blocking filter circuit 27 is set for passing the 887-901 MHz frequency band, the surface acoustic filter 30 and frequency variable trap 28 block the 860-870 MHz frequency band and present a high impedance to the 887-901 MHz frequency band. Conversely, when the bandwidth blocking filter circuit 27 on the transmission side is set for passing the 915-925 MHz frequency band, the bandwidth blocking filter circuit 27 blocks the frequency band 887-901 MHz and presents a high impedance for the 860-870 MHz frequency band. When the bandwidth blocking filter circuit 27 is set for passing the 915-925 MHz frequency band, the surface acoustic filter 30 and frequency variable trap 28 block the 832-846 MHz frequency band and present a high impedance to the 915-925 MHz frequency band.

Despite the variable frequency nature of the isolation provided by Atokawa, it remains fundamentally a duplexer and does not teach or suggest a frequency multiplexer.

This fundamental difference translates into a number of specific functional and structural differences between Appellant's claimed combinations which will now be discussed relative to independent claims 16 and 1, respectively.

(1) Claim 16 -- Atokawa Fails to Disclose:
(a) Selecting an Active Circuit,
(b) Setting the Device in the Selected Circuit into a First State; and
(c) Setting the Devices in the Non-Selected Circuits into a Second State

Appellant's independent claim 16 combination recites a method for switching between frequency bands which includes, among other things, the three steps listed above. Claim 16 also recites certain structural features of the individual circuits, however that subject matter is treated in Section (vii)(2) below.

In the Final Office Action dated May 20, 2004, on page 6, the Examiner indicates that the claimed step of "selecting an active circuit" is taught by applying inputs to terminals CONT1 and CONT2 in Atokawa to thereby select from among transmitting circuit 25 and receiving circuit 26. However, Appellant respectfully disagrees with this characterization of Atokawa because both the transmitting circuit 25 and the receiving circuit 26 are intended to be active simultaneously. Application of inputs to terminals CONT1 and CONT2 merely changes the variable frequency characteristics of the frequency variable bandwidth blocking filter 27 and the frequency variable trap circuit 28, respectively. Both the transmitting circuit 25 and the receiving circuit 27 remain active regardless of the input to terminals CONT1 and CONT2. Thus, as an initial point, it is respectfully submitted that Atokawa does not

anticipate Appellant's claim 16 combination since Atokawa does not fairly teach the step of selecting an active circuit.

Continuing down page 6 of the Final Office Action, the Examiner then indicates that the claimed "device of the active circuit", corresponds to "D1 or D2 or D3" of Atokawa. Furthermore, the Examiner indicates that the claimed "devices of all non-selected circuits" correspond to "D1 and D2" of Atokawa. Appellant respectfully submits that D1 and D2 cannot reasonably be said to correspond to both the selected active circuit and the non-selected circuits. Accordingly, since the Final Office Action references column 6, lines 53-58 of Atokawa wherein D1 and D2 are in the OFF state, Appellant presumes that the Final Office Action intended to allege that only diode D3 of Atokawa corresponds to the claimed "device of the active circuit."

To summarize the undersigned's understanding of the Final Office Action regarding steps (b) and (c) in the header above, it appears that the Examiner is arguing that these steps are taught by Atokawa when diode D3 is set to ON and diodes D1 and D2 are set to OFF. If the undersigned is mistaken, he would appreciate some clarifying remarks in the Examiner's Answer. If, however, this understanding is correct, then it is respectfully submitted that Atokawa also fails to anticipate Appellant's claim 16 combination, because this combination of diode states never occurs in the duplexer of Atokawa.

To see why this is true, note that diodes D1 and D2 are set to their OFF states when it is desired for transmitting circuit 25 to transmit in the band 915-925 MHz. *See* column 6, lines 53-58 of Atokawa. However, when the transmitting circuit 25 is set to transmit in the 915-925 MHz bandwidth, the frequency variable trap circuit 28 is controlled such that the

trap frequency is high. *See* column 8, lines 16-19 of Atokawa. In order to control the frequency variable trap circuit 28 to set the trap frequency high, a negative voltage is applied to terminal CONT 2 and diode D3 is set to its OFF state. *See* column 8, lines 7-9 of Atokawa. Thus, Atokawa teaches that when diodes D1 and D2 are OFF, then diode D3 is also OFF. Thus, the settings for diodes D1, D2 and D3 of Atokawa do not teach or suggest "setting the device of the active circuit into the first state and setting the devices of all non-selected circuits into a second state" as set forth, among other features, in Appellant's claim 16 combination.

(2) Claim 1 -- Atokawa Fails to Disclose That Each Circuit Has A First Filter Characteristic That Passes A First Frequency Band and Substantially Blocks a Second Frequency Band and a Second Frequency Characteristic Which Substantially Blocks the First and Second Frequency Bands

This argument also applies with equal force to Appellant's claim 16 combination. As mentioned above, Atokawa describes a duplexer which provides for variable frequency isolation of the transmitter and receiver. By way of contrast, Appellant's claim 1 combination recites a frequency multiplexer. The first and second filter characteristic described in claim 1 as being attributable to each circuit enable selection of one circuit path, and non-selection of the other circuit paths.

There are no reasonable mappings to be found between the filter characteristics of any filter in Atokawa and Appellant's claimed first and second filter characteristics. This is not surprising, since the filter characteristics of Atokawa are chosen to permit both the transmit and receive side to operate simultaneously, whereas the filter characteristics described and claimed in the present application are chosen to implement a multiplexing function. At a highest level, there can be no first filter characteristic as claimed because the system of

Atokawa passes one frequency band on the transmit side and a different frequency band on the receive side. Thus, there can be no first filter characteristic common to each filter circuit which passes the same first frequency band as claimed.

More specifically, the system of Atokawa describes duplex transmission and reception of NTACS-CDMA signals wherein the frequency bandwidth on the transmit side is 887-925 MHz and the frequency bandwidth on the receive side is 832-870 MHz. Regardless of which sub-band is selected for transmission or reception within these frequency bandwidths, the variable frequency bandwidth blocking circuit 27 (on the transmit side) and the frequency variable trap circuit 28 and surface acoustic wave filter circuit 30 (on the receive side) do not share a common filter characteristic that passes the same first frequency band. Nor does the Final Office Action attempt to identify which band in Atokawa is alleged to correspond to the claimed "first frequency band".

Similarly, Atokawa fails to disclose the frequency blocking aspects of the claimed first and second filter characteristics. As described above, Atokawa discloses that the variable bandwidth blocking filter circuit 27 on the transmission side blocks either the 887-901 MHz frequency band or the 915-925 MHz frequency band, while the circuitry on the reception side blocks either the 832-846 MHz frequency band or the 860-870 MHz frequency band. Hence, the transmission circuit of Atokawa blocks a first or second frequency band (i.e., either 887-901 MHz or 915-925 MHz), while the reception circuit of Atokawa blocks a third or fourth frequency band (i.e., either 832-846 MHz or 860-870 MHz). Accordingly, Atokawa does not disclose that each circuit has a "first circuit characteristic that passes a first frequency band and substantially blocks a second frequency band" and "a second filter

characteristic which substantially blocks the first and second frequency bands" as recited in Appellant's claim 1 (and claim 16) combination.

(3) Conclusion to Arguments

For at least the foregoing reasons, it is respectfully submitted that independent claims 1 and 16 are not anticipated under 35 U.S.C. §102 by Atokawa. The dependent claims are also allowable for at least the reasons set forth above with respect to the independent claim from which they depend. Accordingly, it is respectfully requested that the Final Rejection in the Official Action of May 20, 2004 be REVERSED.

Respectfully submitted,

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(viii) CLAIMS APPENDIX

1. A frequency multiplexer for switching between frequency bands comprising:

a plurality of circuits, connected to a common terminal, wherein each of the circuits comprises:

a filter; and a device connected to the filter,

wherein

the device has first and second states;

each circuit has a first filter characteristic that passes a first frequency band and substantially blocks a second frequency band when the device is in the first state; and

each circuit has a second filter characteristic which substantially blocks the first and second frequency bands when the device is in the second state, wherein the second filter characteristic is a result of the device and the filter acting in combination.

2. The frequency multiplexer of claim 1 further comprising:

a controller that selectively places each said device in the first state or the second state, wherein when one of the plurality of circuits is conducting signals of the first frequency band the controller places each remaining device of the plurality of circuits in the second state.

3. The frequency multiplexer of claim 2 wherein the controller comprises a plurality of individual controllers, each for controlling the device of a corresponding one of

the circuits.

4. The frequency multiplexer of claim 2 wherein each said device comprises:

a switch device; and an element.

5. The frequency multiplexer of claim 4 wherein said element is a capacitor.

6. The frequency multiplexer of claim 4 wherein said switch device is a diode.

7. The frequency multiplexer of claim 6 wherein each diode is a PIN diode.

8. The frequency multiplexer of claim 2 wherein each said second frequency band of said plurality of circuits is a same frequency band.

9. The frequency multiplexer of claim 8 further comprising:

an alternate circuit having a filter and a filter characteristic that passes each said second frequency band of said plurality of circuits and substantially blocks each said first frequency band of said plurality of circuits.

10. The frequency multiplexer of claim 9 wherein said controller places each said device into the first state when the alternate circuit is conducting signals of the second frequency band.

11. The frequency multiplexer of claim 1 wherein each filter comprises:

a first inductor connected in series with a filter capacitor; and

a second inductor connected in parallel with both the first inductor and the filter capacitor.

12. The frequency multiplexer of claim 11 wherein each device comprises:

a first capacitor connected in series with a switch device, wherein the switch device and the first capacitor are connected in parallel with the first inductor.

13. The frequency multiplexer of claim 12 wherein each switch device is a diode.

14. The frequency multiplexer of claim 13 wherein each diode is a PIN diode.

15. The frequency multiplexer of claim 1 wherein each of the first frequency bands is a high frequency band and each of the second frequency bands is a low frequency band.

16. A method for switching between frequency bands comprising the steps of:

selecting an active circuit from a plurality of circuits, wherein

each circuit is connected to a common terminal, each circuit has a first filter characteristic that passes a first frequency band and

substantially blocks a second frequency band when a device is in the first state, and

each circuit has a second filter characteristic which substantially blocks the first and second frequency bands when the device is in the second state, wherein the second filter characteristic is a result of the device and a filter acting in combination;

setting the device of the active circuit into the first state; and

setting the devices of all non-selected circuits into a second state.

17. The method of claim 16 further comprising the step of:

conducting a signal through the active circuit, wherein the signal is of the first frequency band of the active circuit.

(ix) EVIDENCE APPENDIX

None.

(x) RELATED PROCEEDINGS APPENDIX

None.